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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,858	07/12/2006	Yusuke Fukuoka	900-556	7745
23117 7590 08/26/2010 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
FORD, NATHAN K				
ART UNIT		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/585,858

Applicant(s)

FUKUOKA ET AL.

Examiner

NATHAN K. FORD

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 28-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 31-36, 38 and 39 is/are rejected.
- 7) ☒ Claim(s) 28-30 and 37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB06)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Applicant's Response

Acknowledged is the applicant's request for reconsideration filed June 11, 2010. Claims 1, 28, and 31 are amended; claim 27 is canceled; claims 35-39 are new.

The applicant contends:

(1) Employing a tray in the systems of Toshifumi or Hassan, as suggested by the examiner, would not increase wafer throughput.

(2) The prior art does not disclose a tray having engagement parts arranged along the moving direction of the tray, wherein the engagement part is either a recess or a projection.

(3) Claim 31 recites the feature of the conveying arm being provided only within one of the chambers, wherein Toshifumi's conveying arm moves through all of the chambers.

(4) Regarding claims 4, the excerpt of Baxter cited by the examiner does not disclose a pair of pulleys with a wire wound about them.

In response, these arguments have been considered but are not persuasive the reasons elaborated below:

(1) The examiner disagrees, noting that Toshifumi's unmodified conveying arm is only capable of translating a single wafer at a time along the length of the track. If, however, the conveying arm was modified to engage a tray having several wafers disposed thereon, the number of wafers conveyed during one traversal of the track length by the arm would increase. Thus, using a tray provides the benefit of increased throughput.

(2) The examiner acknowledges that Iwasaki's tray does not include a projection or recess, but this is because the tray is moved by a conveyor belt – these features are thus unnecessary. However, upon the incorporation of the tray within a system availing a conveying arm for translation such as Toshifumi's, it becomes obvious outfit the tray with a recess or projection in order to secure the arm to the tray so as to prevent slippage.

(3) As Toshifumi's conveying arm moves along the length of the track, it enters only into one chamber at a time. In this way, the arm is “provided within only one of the first and second vacuum chambers.” Claim 31 as written does not foreclose the possibility of the conveying arm being provided within different chambers at different times.

(4) Paragraphs thirty-four and thirty-seven of Baxter disclose a substrate transfer arm having a pulley mechanism which effects its movement. This mechanism comprises two pulleys – a transfer pulley (92) and a drive pulley (94) – connected by a wire (96) [0037]. Baxter thus teaches each structural component recited by applicant's claim 4.

Art Unit: 1712

Separately, the examiner would like to suggest the following amendments to claims 1 and 35 so as to place them in condition for allowance.

Regarding claim 1: Reciting the feature of the conveying arm engaging one of the plurality of engagement parts to move the tray partway to the second vacuum chamber, then engaging another of the plurality of engagement parts to move the tray into the second vacuum chamber.

Regarding claim 35: Reciting the feature of the conveying arm engaging a first portion of the tray to move the tray partway to the second vacuum chamber, then engaging a second portion to move the tray into the second vacuum chamber.

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on January 30, 2004. As the International Bureau has not provided a certified copy of the foreign priority application, the applicant is requested to file a certified copy of the Japanese application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 35 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 35 recites two contradictory features: (1) "a conveying arm...to move the tray from a first vacuum chamber to a second vacuum chamber"; (2) "wherein a range of movement of the conveying arm is smaller than a distance that the tray must travel to move from the first vacuum chamber to a second adjacent vacuum chamber." If the conveying arm does not possess a range of motion sufficient to move the tray from the first to second chamber, it is unclear how the first provision - moving the tray from the first to second chamber - can be achieved.

It should be noted that claim 37 resolves this ambiguity by reciting how the conveying arm disengages from the tray and then re-engages in such a way as to translate the tray into the second chamber.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1712

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 7, 31-36, and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshifumi et al., JP 02-130849, in view of Hassan et al., US 4,348,139, and Iwasaki et al., US 5,174,881.

Claims 1, 7, 35, 38-39: Toshifumi discloses a conveyor system for semiconductor wafers. The conveyor track comprises a plurality of holes (4, 5) through which gas is injected to suspend the wafer. Further, various pins (7) connected to a driver (6) secure and translate the wafer along the track. This arrangement of the engagement pins, the driver, and the actuator (8) compose the "conveyance arm." It should be noted that Toshifumi's invention is drawn narrowly to the technique of conveying a wafer along an air track and is silent regarding the other constituents of the semiconductor processing system in which the invention is to be employed.

In supplementation, Hassan discloses a fully articulated semiconductor processing system which avails an air track and further comprises:

- A plurality of vacuum chambers for processing a substrate (4, 9-34; Fig. 1);
 - Wherein an exhaust device must be inherently connected to each chamber to effect a vacuum (9, 53-57);
- A guide plate arranged at the bottom of each vacuum chamber (Fig. 10b);
 - Wherein each plate has a plurality of gas emission holes (124) (5, 40ff; 9, 45-50);
 - Wherein a gas supply source must be present inherently to provide gas to the emission holes;
- A substrate mounted on the guide plate;
- Wherein a shutter (123) is disposed between the vacuum chambers (9, 45-50);
- A mechanism which controls (9, 45-65):
 - The opening of the shutter;
 - The emission of gas through the emission holes;
 - The movement of the tray, whereby the tray is floated by the emitted gas, from the guide plate of one chamber to the guide plate of an adjacent chamber via the conveying arm.

It would have been obvious to augment Toshifumi's conveyance track with these features to commission the fabrication of semiconductors. It is worthy of attention that Hassan's air track is configured such that a conveyance arm is not required for wafer translation, but the examiner nevertheless maintains that since both Hassan's and

Art Unit: 1712

Toshifumi's technique of wafer conveyance achieves the equivalent result of moving a wafer along an air track, the selection of either alternative would have been obvious to the skilled artisan.

Lastly, Toshifumi does not interpose a tray between the air track, i.e., the guide plate, and the wafer. Iwasaki is thus cited to cure the deficiency (Fig. 11). The teaching elaborates a semiconductor processing system wherein multiple wafers (4) are disposed atop a tray (30) which is conveyed along a track through a plurality of vacuum chambers (18, 57ff). This arrangement augments throughput by increasing the number of wafers that can be transported per unit time. Given this teaching, it would have been obvious to one of ordinary skill to transfer multiple wafers on a single, floatable tray to accelerate processing. Toshifumi's conveyance mechanism would certainly be amenable to this revision, as it can "cleanly convey an article of an arbitrary shape" (abstract). In demonstration, the drawings of Toshifumi depict the conveying mechanism engaging circular, annular, and square substrates. Thus, the pins could easily be configured to accommodate the dimensions of a tray.

Concerning the new material: Iwasaki's tray does not include a projection or recess, but this is because the tray is moved by a conveyor belt - these features are thus unnecessary. However, upon the incorporation of the tray within a system availing a conveying arm for translation such as Toshifumi's, it becomes obvious outfit the tray with a recess or projection is order to secure the arm to the tray so as to prevent slippage.

Claim 2: As described above, the movements of Hassan's shutter and rotatable section are controlled. Further, the air provided through the holes of the conveyance track is carefully modulated, and to achieve such control each structural feature recited by the applicant (supply source, valve, detecting part, etc.) must be inherently present within the system of Hassan (5, 40ff; 9, 13ff).

Claims 31, 36: As the conveying arm traverses the air track, it will inevitably pass through the first vacuum chamber, and, for a period of time, be positioned squarely within that chamber.

Claim 32: In the invention of Toshifumi in view of Hassan, the arm is configured to convey a wafer along a track having a plurality of chambers sequentially disposed thereon. Thus, the arm is configured to move the article with which it is engaged from one vacuum chamber to an adjacent vacuum chamber.

Claims 33-34: The portions of the pins which contact the tray are taken as the "tray contact portion." As depicted in Figure 3 of Toshifumi, pin 7b pushes the rear end of the tray in its direction of movement.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toshifumi in view of Hassan and Iwasaki and in further view of Rigali et al., US 2004/0211516.

Art Unit: 1712

The cited prior art does not articulate a locking means. Rigali, however, discloses a track for workpiece conveyance outfitted with guide rails into which locking edges are inserted; this configuration ensures the alignment of the workpieces traversing the track [0059]. Given this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate guide rails to prevent any undesirable sideways movement (relative to the intended direction of conveyance) of the tray.

Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshifumi in view of Hassan and Iwasaki and in further view of Baxter et al., US 2002/0139481.

Toshifumi is silent concerning the mechanisms which activate the driver. Even so, as Baxter demonstrates, it is well-known in the art to employ pulley mechanisms in the context of wafer conveyance. Specifically, Baxter employs two pulleys (70) to facilitate the manipulation of a substrate support arm and the rotation of substrate itself [0034, 37]. As would be apparent to one of ordinary skill, it would have been obvious to control the tension of the pulley wire to direct the movements of the conveying arm. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to manipulate the conveyance arm of Toshifumi via pulley mechanisms to achieve the predictable result of transporting a substrate.

Allowable Subject Matter

Claims 28-30 and 37 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 28 and 37 recite a conveying arm which engages a first tray portion to translate the tray partway to the second vacuum chamber, the release of the conveying arm from the first portion, the subsequent engagement of the arm with a second portion, and finally the translation of the tray fully into the second vacuum chamber. The teachings of Toshifumi, Iwasaki, and Hassan represent the closest prior art, but none disclose a tray formed with multiple engagement portions to facilitate piecemeal substrate translation. Although Toshifumi's conveying arm is capable of translating a tray, the arm is configured such that it engages every engagement part simultaneously -- that is, the arm is not capable of engaging only a first engagement part to move the tray a certain distance and then engaging only a second engagement part to move the tray the remaining distance. As there is no description in the prior art of such an embodiment, it is the examiner's opinion that the effort necessary to modify the cited references to arrive at the applicant's invention is beyond that of ordinary skill. Claims 28-30 and 37 are allowable for these reasons.

Art Unit: 1712

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan K. Ford whose telephone number is 571-270-1880. The examiner can normally be reached on M-F, 8:30-5:00 EDT. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland, can be reached at 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/N. K. F./

Examiner, Art Unit 1712

/Michael Cleveland/

Supervisory Patent Examiner, Art Unit 1712